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## Bulletin No. 221 - Snakes of Utah

Herbert J. Pack

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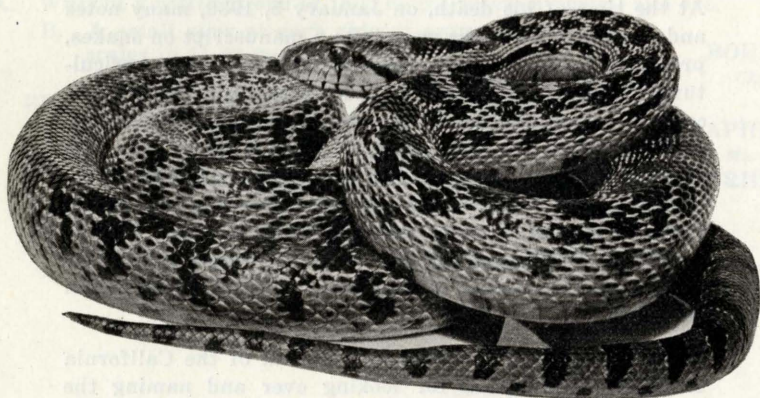
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# Snakes of Utah

**HERBERT J. PACK**

(Compiled by G. F. Knowlton)



Utah gopher snake, *Pituophis catenifer stejnegeri*. Adult male collected in Provo Canyon, Wasatch Mountains, Wasatch County, Utah, May, 1913. After Van Denburgh. (Courtesy, California Academy of Sciences.)

**Utah Agricultural Experiment Station**

**Utah State Agricultural College**

**LOGAN, UTAH**

## FOREWORD

For 17 years the late Dr. Herbert J. Pack, former Station Entomologist, made a study of the reptiles and amphibians of Utah. His original idea was to publish a comprehensive treatment of the snakes and lizards of his state, and whenever opportunity was afforded collected data on their distribution, habits, and economic importance. At the time of his death, on January 5, 1930, many notes and drawings of lizards were left; a manuscript on snakes, presented for his master's thesis to the Utah State Agricultural College in 1923, was also in his possession. Bulletin 221 contains essentially the information presented in this thesis. Little attempt has been made to bring it up to date, the thought being to present the material for what it is worth, even though it might not contain references to a few species added to the list of forms known to occur in Utah. Papers by Dr. V. M. Tanner and Mr. A. M. Woodbury add a few species and a number of new localities to the list herein recorded.

Thanks are due Mr. Joseph R. Slevin of the California Academy of Sciences for looking over and naming the drawing of snakes and lizards, and to Mr. David G. Hall, Jr., of the U. S. Bureau of Entomology, for making the drawings for the manuscript.

P. V. CARDON,  
Director,  
Utah Agricultural Experiment Station.

Logan, Utah  
July, 1930



# Snakes of Utah<sup>1</sup>

By **HERBERT J. PACK**  
(Compiled by G. F. Knowlton)

## INTRODUCTION

Order **SQUAMATA**  
Suborder **SERPENTES—Snakes**

Members of four families of snakes—Boidae, Colubridae, Crotalidae, and Elapidae—are found in Utah. All the known genera<sup>2</sup> within the limits of the state can be determined by the following key:

### Key to Families and Genera of Utah Snakes

- A. Without a rattle at end of tail; no pit between nostril and eye
  - B. A small spur at each side of anus (Fig. 1-E);  
scales in 41 or more rows ..... **BOIDAE**
    - C. Top of head covered with plates; tail blunt..... *Charina*
  - BB. No spur at side of anus; scales in fewer than 41 rows
    - C. Fang at anterior end of upper jaw ..... **ELAPIDAE**
      - No loreal; eye with elliptical pupil ..... *Micrurus*
    - CC. No fang at anterior end of jaw ..... **COLUBRIDAE**
      - D. Scales smooth
        - E. Rostral plate greatly developed
          - F. Rostral flat in front, rear edges  
free and projecting ..... *Salvadora*
          - FF. Rostral rounded in front, rear  
edges neither free nor projecting..... *Rhinocheilus*
        - EE. Rostral plate not greatly developed
          - F. Eye with round pupil
            - G. Upper preocular greatly  
developed, extending onto  
top of head to or nearly  
to frontal; color uniform  
or longitudinally striped  
in adult..... *Coluber*
          - GG. Preocular not extending above onto top  
of head. Color uniform or transversely  
striped
            - H. Color uniform or one stripe across neck
              - I. Scales in 15 rows ..... *Tantilla*
              - II. Scales in 17 rows ..... *Diadophis*
            - HH. Numerous cross stripes or blotches
              - I. Scales in 15 rows ..... *Sonora*
              - II. Scales in 21 or 23  
rows ..... *Lampropeltis*
          - FF. Eye with elliptical pupil; scales  
in 19 or 21 rows ..... *Hypsiglena*
    - DD. Scales not smooth, but keeled
      - E. Scales in 17 to 23 rows ..... *Thamnophis*
      - EE. Scales in 27 to 37 rows ..... *Pituophis*
  - AA. With rattle at end of tail; with pit between nostril  
and eye ..... **CROTALIDAE**
    - B. Top of head covered with small scales instead of usual  
head plates ..... *Crotalus*

<sup>1</sup>Contribution from Department of Entomology, Utah Agricultural Experiment Station.

<sup>2</sup>The known genera from Utah in 1923 at the time Dr. Pack wrote his thesis on snakes from Utah.

Publication authorized by Director, July 31, 1930.



## I. Family BOIDAE

Most of the members of this family are large snakes, with vestiges of the pelvis and hind limbs, the latter usually apparent externally as a small claw-like spur on each side of the anus. These snakes are typically predaceous, feeding upon warm-blooded animals which they hold and crush with their body coils. All are non-poisonous.

Two genera of small boas, *Lichanura* and *Charina*, are found in western North America. *Charina* only is found in Utah.

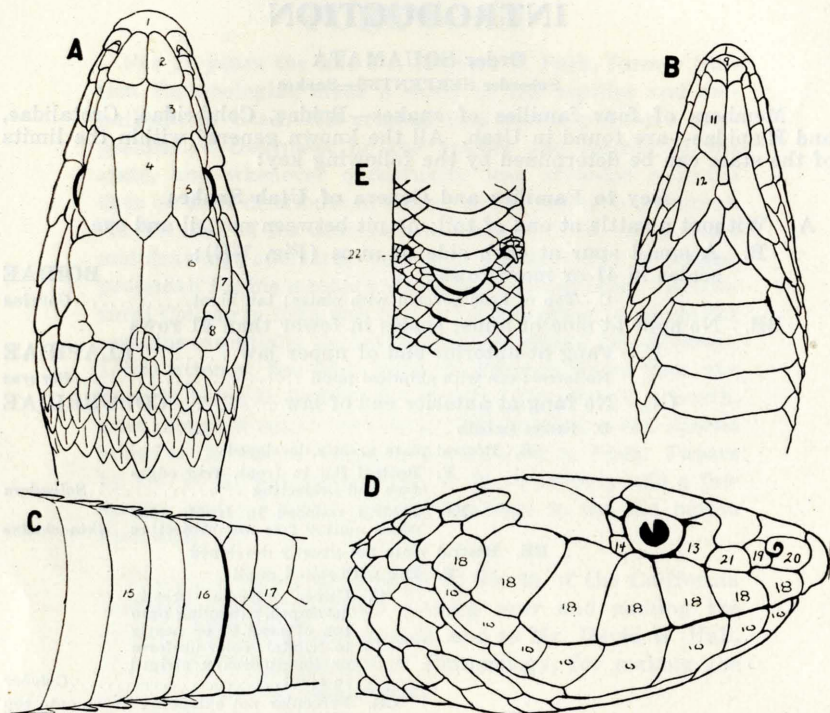


Fig. 1.—Scapulation of snake. A, Dorsal view of head, *Thamnophis* sp.; B, ventral view of head, *Pituophis* sp.; C, junction of body and tail; D, lateral view of head, *Thamnophis ordinoides vagrans*; E, Junction of body and tail, *Charina bottae utahensis*. 1, rostral; 2, internasal; 3, prefrontal; 4, frontal; 5, supra-ocular; 6, parietal; 7 and 8, first and second temporals; 9, symphyseal; 10, infralabials; 11 and 12, anterior and posterior genials; 13, preocular; 14, postocular; 15, gastrostege; 16, anal plate; 17, urostege; 18, supralabials; 19 and 20, nasals; 21, loreal; 22, vestigial limbs.

Genus *Charina*

The head, which is covered above with large irregular plates, is only slightly or not at all distinct from the neck; loreal present; scales on body small and smooth, about as long as wide; anal plate single; urosteges normally single; tail short and blunt; eye small with vertical pupil.

*Charina bottae utahensis* Van Denburgh  
Great Basin Rubber Snake or Rubber Boa

Type locality, Little Cottonwood Canyon, Wasatch Mountains, Wasatch County, Utah.

Top of head slightly rounded; snout extending beyond mouth; usually two supraoculars; a crescent-shaped plate back of the large frontal; about three prefrontals; two postnasals; two internasals; scales smooth in 40 to 49 rows (usually 41 to 45), the lowest row being the largest; gastrosteges narrow and in 202-210 rows; urosteges 33-39 in number, usually single but sometimes the first few are divided; tail short and very blunt; upper surfaces uniform light brown or olive; lower surfaces light yellow except chin and throat which sometimes is clouded with gray or brown.

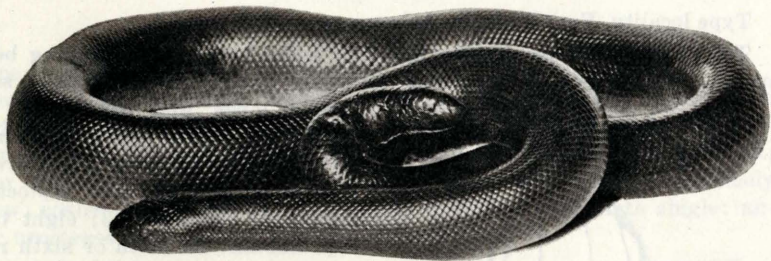


Fig. 2.—*Charina bottae utahensis*, Great Basin rubber snake. Adult female collected in Little Cottonwood Canyon, Wasatch Mountains, Wasatch County, Utah, June, 1913, holding tail in imitation of head. After Van Denburgh. (Courtesy, California Academy of Sciences.)

In Utah this rubber snake or rubber boa has been found in the Wasatch Mountains, at Provo, Little Cottonwood, Salt Lake, Morgan, Brigham City, and Logan. It extends into Idaho, Montana, Wyoming, and farther west it occurs in the humid sections of Nevada, California, Oregon, Washington, and parts of British Columbia.

This harmless snake is found in the moist and shady parts of our mountains. It is slow, retiring, and gentle. Practically nothing is known of its habits.

## II. Family COLUBRIDAE

About nine-tenths of all living snakes belong to the family Colubridae, which is characterized by certain peculiarities of the skeleton, especially the bones of the head. Additional characters are the large, regular head plates; wide ventral plates; no rudiments of limbs or pelvis; well-developed eye with either a round or elliptical pupil; teeth on both jaws.

This great family is divided into three series as follows:

1. *Aglypha*—All teeth are solid and not grooved; harmless and non-venomous.
2. *Opisthoglypha*—One or more of the posterior teeth are enlarged and grooved. Poisonous, but usually not dangerous. *Tantilla* is the only member of this group found in Utah.
3. *Proteroglypha*—Anterior teeth grooved or perforated. This group includes the cobras of the Old World and the coral snakes of America. All are extremely poisonous. A single specimen of the coral snake, *Micrurus euryxanthus*, is recorded near St. George in the extreme southwestern part of the state.



Genus *Salvadora*

Body slender; tail long; head distinct from neck; rostral plate greatly developed, truncate in front with edges projecting backward; other head plates regular; two preoculars; two postoculars; loreal present; seventeen rows of scales smooth, and longer than wide, anal divided; urosteges in two rows; eye large with round pupil.

*Salvadora hexalepis* (Cope)  
Western Patch-Nosed Snake

Type locality, Fort Whipple, Arizona.

Top of head flat or slightly rounded; snout blunt and extending beyond mouth; rostral greatly developed with rear edges projecting free; supra-

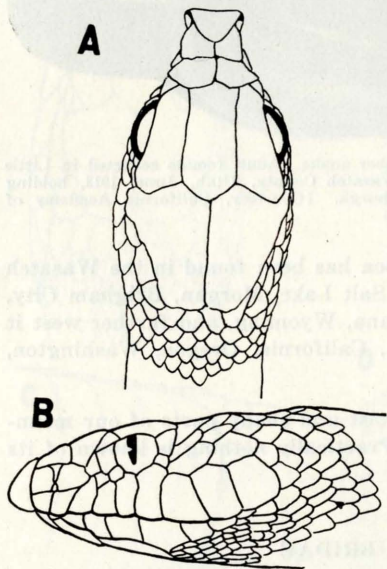


Fig. 3.—Western patch-nosed snake, *Salvadora hexalepis*. A, Dorsal, and B, lateral views of head.

ocular large and about the same length as frontal; two prefrontals; two internasals; loreal often divided; two preoculars and two postoculars; temporals usually 2+3; eight to ten supralabials, the fifth or sixth reaching the eye; 10 to 12 infralabials, the first pair very long, the fifth or sixth largest, followed by the distinctly smaller five or six; two pairs of genials of about equal size; scales smooth and in 17 rows; anal divided; urosteges in two series; color, upper parts of head light brown or greyish; running lengthwise of the body is a median dorsal gray or light brown stripe 3 scales wide; below this, on each side, is a darker stripe 2 to 4 scales in width; in some specimens this region is broken into an upper dark stripe 2 scales wide, below which is a lighter stripe 1 scale wide, followed by a narrow dark line running through the center of the scale; underparts yellow.

The western patch-nosed snake is almost wholly restricted to the Lower Sonoran zone in Utah, Nevada, Arizona, California, and Lower California. In Utah it occurs around St. George, Washington County. There are two specimens in the National Museum labeled "Cottonwood Canyon, Utah," and "Ogden, Utah," respectively. The first locality is indefinite as canyons similarly named occur throughout Utah. Present knowledge of the range of *Salvadora* in Utah restricts it to the Sonoran zone in the southern part of Washington and possibly Kane County. A single specimen was taken at St. George, Washington County, on June 6, 1921.

The specimen referred to was found on the dry, sandy foothills in the western part of St. George. When found it was digging a hole into the gently-sloping hillside. It would thrust in its head, and then with neck bent "S"-shaped it would withdraw, thus pushing the sand back with the



loop of the neck. This process was continued until a hole 3 or 4 inches long was formed.

Genus *Rhinocheilus*

The body is rather slender; head slightly distinct from neck, and ending in a narrow snout far beyond mouth; rostral plate large; head plates normal; usually only one preocular and two postoculars; temporals normally 2+3; loreal present; scales smooth and in 17 to 25 rows; anal divided; urosteges entire except usually toward end of tail; eye with round pupil.

*Rhinocheilus lecontei* (Baird and Girard)  
Long-Nosed Snake

Type locality, San Diego, California.

Head rounded, with long narrow snout; rostral large and recurved on top of snout with posterior edges not projecting free; normally one preocular and two postoculars; temporals usually 2+3; small loreal present; one or two pairs of genials, the posterior pair when present extremely narrow; scales smooth and in 23 or rarely 25 rows; anal plate single; anterior urosteges single, posterior ones often divided.

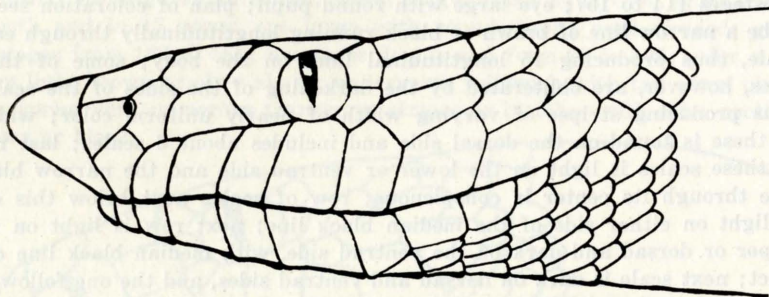


Fig. 4.—Long-nosed snake, *Rhinocheilus lecontei*.

Range from California east and southeast through Arizona, New Mexico, and northern Mexico to Kansas and Texas. The California Academy of Sciences has a specimen taken at St. George, Utah. Van Denburgh reports a specimen in the Hurter collection taken at Glenn's Ferry, Idaho.

Genus *Coluber*

Body long and slender; tail long and tapering; head distinct from neck, long, and with rounded snout; rostral well-developed; head plates normal but large; supraoculars large and about the same length as the frontal; two preoculars, the upper large and extending onto top of head to or nearly to the frontal; two or rarely three postoculars; temporals 2+2; loreal present; the two nasals are separate; two pairs of large genials; scales smooth in 15 to 19 rows; anal usually divided; urosteges in two series; eye large with round pupil.

The members of this genus are known as racers and coachwhip snakes because of their great speed and their long, slender bodies. Their food consists of small rodents, insects, lizards, snakes, and frogs.

The young of this genus are marked with numerous cross-bands of dark brown on a lighter ground color. As they reach maturity this pattern is obscured or entirely obliterated by the darker ground color of the adult.

*Key to the Species of Coluber in Utah*

- A. Scales in 15 rows.....*Coluber taeniatus taeniatus*  
 AA. Scales in 17 rows  
     B. Color in adult uniform olive, or light  
         brown .....*Coluber constrictor mormon*  
     BB. Color not uniform, but with three or more cross stripes on  
         fore part of body.....*Coluber flagellum piceus*

*Coluber taeniatus taeniatus* (Hallowell)

Western Striped Racer

Type locality, New Mexico, west of Rio Grande.

Head long with flattened or slightly concave top at junction of the frontal and prefrontals, due to the increased height of the supraocular at its outer edge; two preoculars, the upper one extending onto top of head to or nearly to frontal; two postoculars; temporals normally 2+2; loreal square or long; nasals separate; eight supralabials and 9 or 10 infralabials; posterior genials as large as or larger than anterior pair; scales smooth and in 15 rows; anal divided; urosteges in two series; gastrosteges from 198 to 215; urosteges 114 to 157; eye large with round pupil; plan of coloration seems to be a narrow line of brown or black running longitudinally through each scale, thus producing 15 longitudinal lines on the body; some of these lines, however, are obliterated by the darkening of the sides of the scales, thus producing stripes of varying width of nearly uniform color; widest of these is found on the dorsal side and includes about 6 scales; last row of these scales is light on the lower or ventrad side and the narrow black line through its center is conspicuous; row of scales next below this one is light on either side of the median black line; next row is light on the upper or dorsad and dark on the ventrad side, with median black line distinct; next scale is dark on dorsad and ventrad sides, and the one following is dark dorsad and light ventrad; next and last scale is light both dorsad and ventrad with black central line conspicuous. Variation from this pattern is probably due to the intensity of coloration in the lateral margins of the scales, which if pronounced enough can entirely obliterate the median line and that part of the body where intensifying occurs. Undersides yellowish or pink, except on forepart of body where there is a pair of small, rounded black spots on each scute.

A specimen from Stockton (Tooele County), May 30, 1920, contained 9 elongate eggs, 6 mm. by 33 mm. An individual from Osceola, White Pine County, Nevada, June 4, 1920, contained 8 large elongate eggs, 10 mm. by 35 mm. The egg membranes are apparently without deposits of lime salts.

Beginning at California this species occupies a fan-shaped territory extending into Idaho, Utah, Colorado, New Mexico, and Texas.

In Utah it has been taken at Ogden, Weber County; Salt Lake City and Holliday, Salt Lake County; Provo, Utah County; Kanosh and Cove Fort, Millard County; Baker's Canyon, Beaver County; near Rush Lake, Iron County; Bluff, San Juan County; Grantsville and Stockton, Tooele County.

This snake moves with great swiftness and often escapes by running into the burrows of rodents. At Grantsville, in a dry wash with precipitous sides, an individual was seen lying in a squirrel's burrow looking out through the open entrance.



In the stomach of a specimen from Stockton was found a *Uta graciosus*, two large beetles, and four red ants. It is not certain, however, that the insects were eaten by the snake as they might have belonged originally with the *Uta*. A specimen taken at Grantsville on June 7, 1923, contained a small rodent and five elongate cylindrical eggs, 15.5 by 57.5 mm., slightly and uniformly calcified.

*Coluber constrictor mormon* (Baird and Girard)  
Western Blue Racer

Type locality, Valley of the Great Salt Lake, Utah.

Body and tail long and slender; head distinct from neck; head plates normal but large; two preoculars; two or three postoculars; temporals normally 2+2; frontal large, about as wide as each supraocular; two large prefrontals and two internasals; nostril large; nasals separated; rostral large and rounded; upper preocular large and extending on top of head to or nearly to frontal; seven or eight supralabials, the third and fourth or fourth and fifth reaching eye; eight or nine infralabials; posterior genials as large or nearly as large as anteriors; loreal large, either square or long; scales smooth and in 17 rows; eye large with round pupil; anal divided; gastrosteges from 162 to 181; urosteges double and from 79 to 102; color, uniform light brown or olive above; underparts yellowish with tail often pinkish; young with numerous transverse stripes or blotches with sides spotted brown or black.

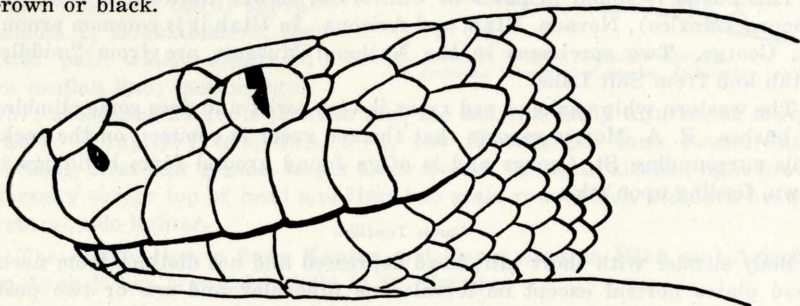


Fig. 5.—Western blue racer, *Coluber constrictor mormon*.

This snake ranges from California north into British Columbia and east into Nevada, Utah, and Idaho. In Utah it has been taken in Logan and Paradise, Cache County; Brigham City, Boxelder County; Ogden, Weber County; Clearfield, Farmington, and Bountiful, Davis County; Salt Lake City, Salt Lake County; Provo, Utah County.

The blue racer is rather common in parts of Utah, particularly along the west side of the Wasatch Mountains from Utah County north throughout the state. It is found on the foothills along streams or in the open, and out into the cultivated lands where wooded streams, grasslands, or waste areas afford retreat. It is sometimes seen climbing among the branches of brush but most of the individuals observed were on the ground. This snake strikes viciously when captured.

The blue racer does not seek hibernation quarters until forced to do so by the severity of approaching winter. In 1922 individuals were active until late September; in 1920 one was taken in North Ogden on October 6. This



snake contained five locusts, apparently *Melanoplus femur-rubrum*. Another specimen from Clearfield, Davis County, taken in August contained a field mouse and a large locust, *Camnula pellucida*.

*Coluber flagellum piceus* (Cope)  
Western Whip Snake

Type locality, Camp Grant, Arizona.

Body and tail long and slender; head distinct from neck; frontal as long as supraocular and widest in front; preoculars two; postoculars two; temporals normally 2+2, but varies; loreal long; nasals separated; rostral large; upper preocular large and extended onto top of head to or nearly to frontal; supralabials usually eight or nine; infralabials nine or ten; posterior genials as long as or longer than anterior; anal normally divided; scales smooth and in 17 rows; gastrosteges from 188 to 213; urosteges double and from 99 to 128; eye large with round pupil; color above grayish, light brown, or pink (on fore part of body) with 3 to 7 brown or black stripes across anterior part of body, beginning just back of temporals; back of the striped region black is restricted to small spots on the scales or to lines at their edges; underparts yellow or whitish except chin and forepart of body which is sprinkled with black, tending to form into about four rows; young, with crossbands over most of body.

This snake is found in parts of California, Lower California, Northern Sonora (Mexico), Nevada, Utah, and Arizona. In Utah it is common around St. George. Two specimens in the National Museum are from "middle" Utah and from Salt Lake.

The western whip snake or red racer is very swift and does some climbing in bushes. R. A. Morris reports that the red racer is common on the rocky hills surrounding St. George and is often found around farm buildings in town, feeding upon mice.

Genus *Tantilla*

Body slender with short tail; head depressed and not distinct from neck; head plates normal except no loreal; one preocular and one or two postoculars; nasals separate; posterior maxillary teeth grooved; scales smooth and in 15 rows; anal divided; urosteges in two series; eye small with round pupil.

The members of this genus are small, smooth snakes, with a light brown body and a black head; they lead a secretive or burrowing life. They are found in South America, Central America, Mexico, and southwestern United States. They are poisonous but not dangerous, as the small grooved fangs are at the back of the upper jaw and ordinarily do not come in contact with a person. Of the few species recognized in the United States, only one is known from Utah.

*Tantilla nigriceps* Kennicott  
Sonoran Tantilla

Type locality, Fort Bliss, New Mexico, and from Indianola to Nueces, Texas.

Head flat above, and not distinct from neck; snout prolonged beyond mouth; no loreal; supraoculars extending forward beyond anterior end

of frontal; prefrontals each as large as frontal; two internasals; nasals separate, with opening in anterior one; temporals 1+1, the first being the larger; one preocular and two postoculars; first genials larger than second pair; scales, smooth and in 15 rows; anal divided; gastrosteges 135 to 143; urosteges double and 51 to 64; eye small with round pupil; upper surface of head back one to three scales behind parietals dark brown or black; a narrow whitish nuchal collar is usually but not always found from one to three scales behind parietals; upper surface of body and tail light brown; lower surfaces light red.

The only specimen available from Utah, a small individual from St. George, has the following characteristics: Parietals fused (probably as the result of injury earlier in life); one preocular and two postoculars; posterior nasal rather widely removed from preoculars by the downward extension of the prefrontal, which meets the upper labials at the junction of the second and third; supralabials 7; infralabials 6, the first pair widely separated on median line; gastrosteges,

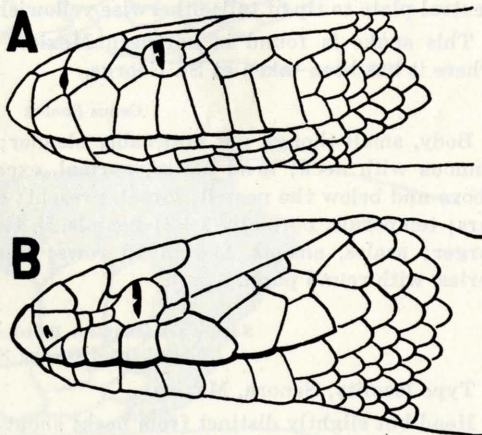


Fig. 6.—A. Sonoran tantilla, *Tantilla nigriceps*.  
B. Sonoran ring-necked snake, *Diadophis regalis*.

167; urosteges, 26 (it is possible that the tail was early injured, as it ends rather abruptly); temporals, 1+1, the first larger than second; anal divided; first pair genials larger than second. Color in alcohol, light brown dorsally except top of head and first two scale rows which are dark brown; ventral side lighter.

The distribution is from Kansas and Texas west to Utah and Arizona. In Utah it has been taken only in St. George.

#### Genus *Diadophis*

Body and tail long and slender; head flat on top, with broad round snout, and slightly distinct from neck; head plates normal; two preoculars and two postoculars; temporals, 1+1; loreal present; nasals normally separate, but may be united; scales, smooth and in 15 or 17 rows; anal divided; urosteges double; eye, with round pupil.

The small dark-colored snakes composing this genus are known as the ring-necked snakes because of a yellow ring about the neck. They are of secretive habits. One species is found in Utah.

*Diadophis regalis* Baird and Girard  
Sonoran Ring-Necked Snake

Type locality, Sonora, Mexico.

Body slender; head flat on top and slightly distinct from neck; snout rounded, with normal rostral, rounded out beneath and wider than high; frontal large, about twice as wide as supraocular and extending posteriorly



beyond it; preoculars two; postoculars two; loreal square and about as large as lower preocular; nasals, united or not; parietals, large; temporals, 1+2; supralabials, normally nine; infralabials eight or nine, the first pair meeting on the midline; genials in two pairs with anterior larger; scales, smooth and in 17 rows; anal divided; gastrosteges 212 to 237; urosteges double and from 58 to 72, eye with round pupil; color, uniform brown above; usually but not always with a narrow light collar across neck; labials and all chin plates with black spot; about four black spots or dashes on each ventral plate to tip of tail; otherwise yellowish beneath.

This snake is found in northern Mexico, Colorado, Arizona, and Utah, where it has been taken at St. George.

Genus *Sonora*

Body, small though not noticeably slender; tail, short; head, nearly continuous with neck; head plates, normal, except that the nasals are united above and below the nostril; loreal, present; one preocular and two postoculars; temporals, normally 1+2; genials, in two pairs, the anterior much the larger; scales, smooth and in 15 rows; anal, divided; urosteges, in two series, with round pupil.

*Sonora semiannulata* Baird and Girard  
Black-Banded Ground Snake

Type locality, Sonora, Mexico.

Head but slightly distinct from neck; snout rounded; body rather cylindrical; tail short; supraoculars extending forward slightly beyond anterior end of frontal; loreal long; nasals entire with opening near upper side; one preocular and two postoculars; temporals 1+2; supralabials seven; infralabials seven; first genials much larger than second pair; scales, smooth, about as wide as long and in 15 rows; anal divided; gastrosteges from 149 to 176; urosteges double and from 45 to 53; eye with round pupil; color, bright red bands alternating with black bands of about the same width; end of snout and back over head to a line connecting the center of the eyes is red, followed by a crescentic black blotch across head including orbit and back nearly to end of parietals; red bands not encircling body but ending rather abruptly at about the center of the side, being here replaced by light pink; black bands continued onto edges of gastrosteges, but encircling body on tail; about 34 red or black bands across body and 10 on tail; colors very bright and lustrous; ventral side yellowish. The color description is from a living specimen from St. George.

This snake has been found in southern Kansas, Texas, Colorado, Utah, Nevada, Arizona, and Sonora (Mexico). In Utah it has been taken at Rockville, Kane County, and at St. George.

Little is known of its habits. R. A. Morris reports that in St. George it is found under rocks and is slow in movements.

Genus *Lampropeltis*

Body rather thick, tail short; head slightly distinct from neck, with prominent snout; head plates normal; one preocular and two postoculars; loreal present; nasals separate; temporals 2+3; anal entire; urosteges in two series; scales smooth and in 17 to 27 rows; eye with round pupil.



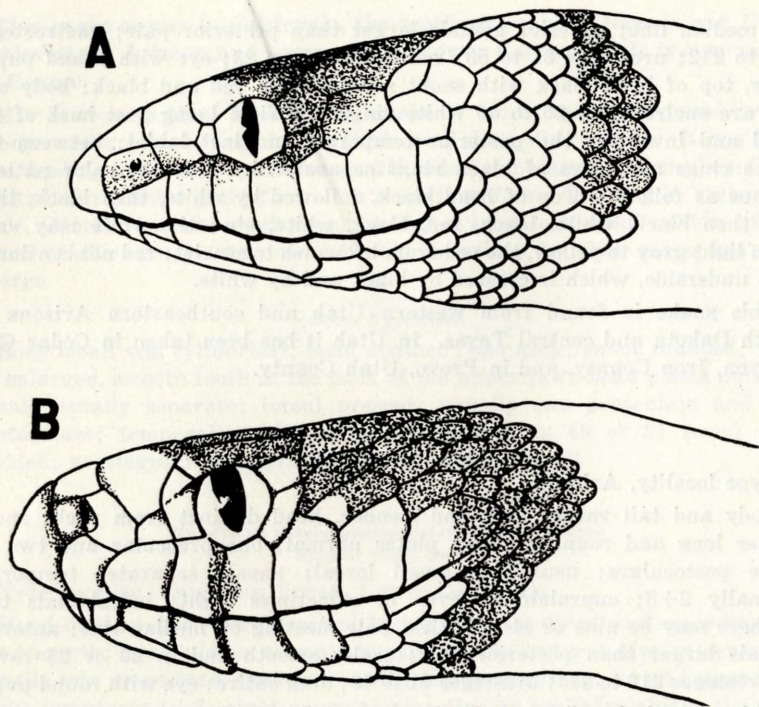


Fig. 7.—A. Black-banded ground snake, *Sonora semiannulata*.  
B. Arizona King Snake, *Lampropeltis pyromelana*.

The members of this genus are commonly known as king snakes. Their striking colors are arranged in transverse stripes or blotches. King snakes are found in Central America, in Mexico, and in the United States. A closely allied genus, *Coronella*, is found in the Old World.

The three species of king snakes found in Utah can be determined by the following key:

- A. Some red in coloration
  - B. Gastrosteges from 176 to 212; urosteges 31 to 53; body and tail crossed by 25 to 40 whitish stripes—*L. triangulum gentilis*.
  - BB. Gastrosteges from 216 to 235; urosteges 61 to 79; body and tail crossed by 49 to 63 whitish stripes—*L. pyromelana*.
- AA. No red in coloration—white and black—*L. getulus boylii*.

*Lampropeltis triangulum gentilis* (Baird and Girard)  
Western King Snake

Type locality, north fork of Red River near Sweetwater creek, Wheeler County, Texas.

Body cylindrical, with tapering tail; head rather distinct from neck; head plates normal; one preocular and usually two postoculars; loreal longer than high; nasals separate; temporals normally 2+3; supralabials seven, rarely eight; infralabials nine, rarely eight or ten, the first pair meeting on

the median line; anterior genials larger than posterior pair; gastrosteges 176 to 212; urosteges 31 to 53; sometimes 19 or 23; eye with round pupil; color, top of head black with snout mottled with red and black; body and tail are encircled by 25 to 40 white rings, the first being just back of the head and involving the posterior temporals and last labial; between the white rings are pairs of black rings separated by red; the color pattern is thus as follows: Top of head black, followed by white, then black, then red, then black, white, black, red, black, white, etc.; the white may vary from light gray to yellow, the red from brownish to scarlet; red not continued onto underside, which is crossed by black and by white.

This snake is found from western Utah and southeastern Arizona to South Dakota and central Texas. In Utah it has been taken in Cedar City Canyon, Iron County, and in Provo, Utah County.

*Lampropeltis pyromelana* (Cope)  
Arizona King Snake

Type locality, Arizona.

Body and tail rather long and slender, head distinct from neck; snout rather long and rounded; head plates normal; one preocular and two or three postoculars; usually a small loreal; nasals separate; temporals normally 2+3; supralabials seven or sometimes eight; infralabials ten, or there may be nine or eleven, first pair meeting on median line; anterior genials larger than posterior pair; scales smooth and in 23 or 25 rows; gastrosteges 216 to 235; urosteges 61 to 79; anal entire; eye with round pupil.

This snake is found usually in the mountain ranges or forests in northern Mexico, Arizona, Utah, and New Mexico. In Utah it has been taken at Granger, Salt Lake County, and in Beaver Canyon, Beaver County. The Granger specimen was first sent to the Utah Station; later it was sent to the California Academy of Sciences.

Nothing is recorded on the habits of this snake.

*Lampropeltis getulus boylii* (Baird and Girard)  
Boyle's Milk Snake

Type locality, El Dorado County, California.

This is a large stout form with a short tapering tail; head is distinct from neck; head plates normal; one preocular and two postoculars; loreal rarely absent; nasals separate; temporals 2+3; rostral large and hollowed below; supralabials seven, rarely eight; infralabials usually nine, but there may be eight or ten, the first pair meeting on the median line; anterior genials larger than posterior pair; scales smooth and in 23 or rarely 25 rows; anal single; gastrosteges 206 to 254; first two or three urosteges often entire, remainder double, numbering from 41 to 62; eye with round pupil; color, top of head including posterior margin of prefrontals, frontal, supraoculars, and parietals and back over body for about eight scales is black; snout and rest of head white or cream with black lines; about 23 to 39 white rings encircle the black body and 5 to 10 occur on the tail; the white rings begin to widen on the sides and are about as wide ventrally as the black blotches; these characteristic light rings are usually cream-colored or yellowish.



This snake occurs in California, the southern parts of Nevada and Utah, northwestern Arizona and northwestern Lower California. It is common in St George.

Morris reports that Boyle's milk snake is most frequently found in St. George under piles of hay in the fields and along ditch banks. It has been seen feeding upon mice and other small rodents; because of these beneficial habits it is afforded protection. It is sometimes found climbing in bushes for birds. Morris has observed young doves, a small cottontail rabbit, and a lizard (*Callisaurus*) eaten on different occasions by this snake near St. George.

Genus *Hypsiglena*

Body small and cylindrical; head distinct from neck; snout rounded; with an enlarged, smooth tooth at the back of the upper jaw; head plates normal; nasals usually separate; loreal present; usually two preoculars and two postoculars; temporals 1+2; scales smooth and in 19 or 21 rows; anal divided; urosteges in two series; eye with vertical pupil.

*Hypsiglena ochrorhynchus ochrorhynchus* (Cope)

Spotted Night Snake

Type locality, Cape San Lucas, Lower California.

Head distinct from neck; rostral large; snout rounded and extending beyond mouth; head plates normal; nasals usually but not always separate; usually two preoculars, the lower small; two postoculars; loreal longer than high; temporals 1+2; eight supralabials; nine or ten infralabials, the first pair meeting on median line; genials in two pairs of about equal size; anal divided; gastrosteges from 160 to 191; urosteges double and from 38 to 66; scales smooth and in 21 or rarely 23 rows; pupil of eye elliptical; color, upper surface gray or yellowish, with a single or double series of brown or black blotches along center of back; two or four series of small dark spots along side; neck with long blotches sometimes forming a collar; top of head and labials spotted; ventral side white or yellowish.

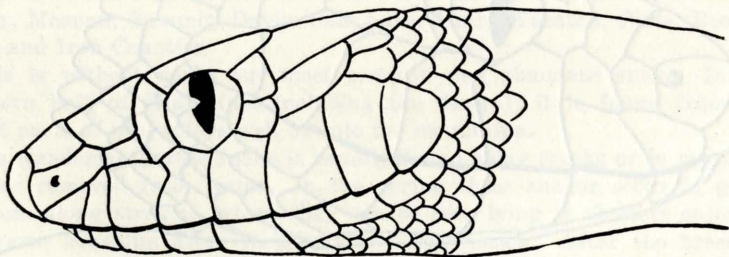


Fig. 8.—Spotted night snake, *Hypsiglena o. ochrorhynchus*.

Found in Lower California, California, Nevada, Arizona, and Utah. In 1910 two specimens were obtained, at Fort Douglas, east of Salt Lake City, by the California Academy of Sciences.

This little spotted snake is usually found under stones and is probably nocturnal.



Genus *Thamnophis*

Body robust or slender, with moderately long tapering tail; head distinct from neck; head plates normal; one or two preoculars extending upward to or onto top of head; one to four postoculars; loreal present; temporals normally 1+2; two pairs of genials, scales keeled and in 17 to 23 rows; anal normally divided; urosteges double; eye with round pupil.

The members of this genus are known as garter snakes and are the most abundant snakes in North America and Mexico. They produce great numbers of living young, from a few to as many as 80 in rare cases. They occur typically along streams or ponds into which they readily retreat from danger. The food of this large group of snakes varies, including fish, frogs and toads, insects, worms, birds, and mammals.

The two species of garter snakes found in Utah can be distinguished by the following key:

- A. Scales in 19 rows; spots or bars of red on sides—*T. sirtalis parietalis*.
- AA. Scales in 21 rows; no red on sides—*T. ordinoides vagrans*

*Thamnophis sirtalis parietalis* (Say)  
Prairie Garter Snake

Type locality, west side of the Missouri River three miles above the mouth of Boyer's River.

Body robust, tail long and tapering; head distinct from neck; temporal regions often swollen; snout rather pointed with rounded end; rostral large; one large preocular reaching to top of head; three small postoculars; loreal prominent; nasals separate; frontal about as long as the supraoculars; prefrontals slightly larger than internasals; parietals large; temporals normally 1+2 but may be 1+3, 1+1 or 2+3; supralabials seven or eight; infralabials nine or ten, the first pair meeting on the

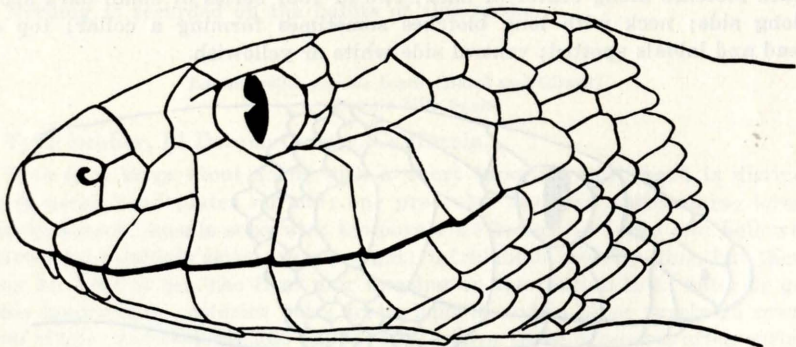


Fig. 9.—Prairie garter snake, *Thamnophis sirtalis parietalis*.

median line; the posterior genials are often longer than the anterior pair; scales strongly keeled in 19 rows; anal entire; gastrosteges from 157 to 168; urosteges double and 74 to 87; eye large with round pupil; ground color above olive to blackish; three longitudinal stripes, one on the mid-dorsal line and one along the second and third scale rows on either side; the

sides of the body bear red spots or bars, formed largely upon the skin between the scales but often encroaching upon the bases of the scales; under parts dark olive to yellow.

This is a Great Plains form, ranging west from Minnesota, Iowa, and Missouri to Utah and Idaho. In Utah limited numbers are found in the territory from Utah to Cache County. It is much less common than the wandering garter snake, *T. ordinoides vagrans*.

This snake is found along streams but occasionally penetrates a considerable distance into the meadows and fields. In Davis and Salt Lake Counties it has been observed along streams in association with the wandering garter snake. In such places it often seeks protection in the burrows of mice or musk rats. Little is known of its food habits.

*Thamnophis ordinoides vagrans* (Baird and Girard)  
Wandering Garter Snake

Type locality, California.

Head distinct from neck; snout rounded, not extended far beyond mouth; rostral large; one large preocular extending to or onto top of head; postoculars normally three, rarely two or four; frontal about as long as supraoculars; prefrontals slightly larger than internasals; nasals separate; loreal prominent; temporals normally 1+2, but may be 1+3; parietals large; genials in two pairs, about equal; normally eight supralabials; infralabials normally ten, the first pair meeting on the median line; anal entire; gastrosteges 148 to 182; urosteges double, from 67 to 95; eye moderately large and with round pupil; scales keeled and in 21 (rarely 19) rows; the ground color above is greenish-yellow to brown; three longitudinal stripes of yellow, one on the mid-dorsal line and one running through the second and third scale rows on either side; on each side of the back are two series of black spots, sometimes united to form a zigzag band along each side; the black spots as well as the longitudinal lines vary greatly in distinctness; bluish or slate on underparts except throat and chin which are normally yellow.

Distribution, eastern Washington, Oregon, Idaho, Utah, Nevada, California, northern Arizona. In Utah it occurs at least in Cache, Boxelder, Weber, Morgan, Summit, Davis, Salt Lake, Utah, Wasatch, Piute, Beaver, Juab, and Iron Counties.

This is without doubt our most common and abundant snake. In the northern half of Utah (not including the desert), it is found from the lowest parts of the valleys well up into the mountains.

The wandering garter snake is usually found along creeks or in meadows not far removed from water. In the spring these snakes occur in great numbers along streams, where they can be seen lying in clusters enjoying the warm sunshine after their winter's hibernation. After the breeding season is over in late spring or early summer they become somewhat scattered and are often found singly. In the fall of the year they congregate at suitable wintering quarters and can be seen during the warmer parts of the day until driven in by the cold storms of October. On October 9, 1921, these snakes were still abroad at Murray, Salt Lake County. They were found basking in the sun along the banks of a stream either singly or in masses, numbering to a dozen or more. Others were seen lying upon the



branches of shrubs or trees overhanging the water. One of these was on slender branches about 8 feet above the stream. It requires five or six hours of morning sunshine to warm up the snakes before they are ready to come up and move about.

Winter is passed in a crevice or burrow usually in the bank of a stream. An abandoned muskrat burrow is an ideal place. Here they sleep, massed together in considerable numbers. A few years ago while plowing deeply along a creek bank on March 15 a muskrat burrow was opened up from which a mass of 35 snakes was removed. All sizes were represented. One was a red-barred garter snake, *T. sirtalis parietalis*.

This snake swims well and often evades capture by gliding into water. It does not remain there long, however, as it usually swims at once to the shore a short distance away.

#### Genus *Pituophis*

Body long and stout, tail of moderate length; head slightly distinct from neck; snout long and rounded, extending beyond mouth; head plates variable; one or two preoculars, and two to four postoculars; loreal present; nasals usually separate; temporals many and variable; other head plates normal except four instead of two prefrontals; scales in 27 to 37 rows, with at least the dorsal rows keeled; anal single; urosteges double; eye large with round pupil.

The members of this genus are known as gopher, blow, or bull snakes. Among them are some of the largest snakes of the United States. In Utah a single form is known at present. However, few, if any, specimens have been studied from certain parts of its range in the state.

#### *Pituophis catenifer stejnegeri* Van Denburgh Utah Gopher Snake

Type locality, Fort Douglas, Salt Lake County, Utah.

Body moderately robust, with head distinct from neck; snout rather narrow, long and projecting; rostral large, prominent, often recurved; preoculars one; postoculars three—subject to variation; loreal elongate; nasals separate; prefrontals normally four; temporals vary from two to five; supralabials usually eight, infralabials usually thirteen; anterior genials larger than posterior pair; anal entire; gastrosteges from 223 to 241; urosteges in double series and from 55 to 62; scales keeled and in 27 to 33 rows, usually 29; eye large with round pupil; ground color is light brown or grayish-yellow, with fore part of body often showing orange; across the middle of the back is a series of 50 to 68 dark blotches, black on the anterior and posterior ends of body and brown between; upper surface of tail crossed by 14 to 20 black blotches; blotches rather rounded on fore part of body, becoming quadrate posteriorly; several series of dark spots or blotches, often confluent, along sides; a well-defined narrow dark line crosses head between preoculars; another band runs backward and downward from postoculars; underparts yellowish and with irregular spots or blotches (Cover cut).

This snake is found at least in the following counties of Utah: Cache, Boxelder, Weber, Davis, Salt Lake, Wasatch, Utah, Grand, Millard, Beaver, and Iron.

The gopher snake is found usually in the drier regions in uncultivated land or in hay and grain fields. It is the largest of the Utah snakes and is entirely harmless and extremely beneficial. No doubt a few fledging birds are occasionally eaten, but the bulk of the food consists of noxious rodents such as mice, ground squirrels, etc. In 1922 a gopher snake was seen swallowing a young mourning dove. A large gopher snake killed in a hay field by some boys was opened and 35 field mice were found, most of which were small. The gopher snake ranks with the most beneficial of reptiles. It should be as fully protected as the insect and rodent-eating birds.

### III. Family ELAPIDAE

#### Genus *Micrurus*

Body cylindrical with short tail; head small, not distinct from neck; snout short and rounded; head plates normal except no loreal; scales smooth, not overlapping, and in 15 rows; permanent erect, grooved fang is found at the front end of each upper jawbone and is not followed behind by small teeth; anal divided; all or most urosteges double; eye small, with elliptical pupil.

The members of this American genus are known as the "coral snakes" because of their bright and contrasting colors of black, red, and yellow. They are often confused with harmless snakes such as the king snakes from which they can always be told by an examination of the teeth and a difference in the order of colors. In the coral snake red is bounded on each side by yellow, while in the king snake red is bounded by black.

The members of this genus are among the most poisonous of snakes. Because of their beauty and gentleness they have sometimes been kept as pets under the mistaken impression that they were non-poisonous. When it is recalled that these snakes are close relatives of the cobra and have venom similar in physical and chemical nature, the delusion of their harmlessness is quickly dispelled.

Only two species of *Micrurus* occur in the United States; one of these invades southwestern Utah and has been taken once at St. George.

#### *Micrurus euryxanthus* (Kennicott)

##### Sonoran Coral Snake

Type locality, Sonora.

Body cylindrical, with moderately short tapering tail; head slightly distinct from neck, ending in a short round snout; head plates normal except no loreal; one preocular and two postoculars, nasals separate; rostral large; temporals 1+2; supralabials and infralabials seven each; genials two pairs, very short; scales smooth and in 15 rows; anal divided; gastrosteges 215 to 241; urosteges double and from 21 to 29; eye small, with elliptical pupil.

This coral snake ranges from northern Mexico through Arizona to extreme southern Utah, where a specimen is reported from St. George Canyon.

### IV. Family CROTALIDAE

#### Pit Vipers

These snakes are known as pit vipers because of a peculiar pit on the side of the head back of and below the nostril. There is a large concavity



in the lateral side of the maxillary into which this pit extends. A large erectile fang is found in the short maxillary bone at the anterior end of the upper jaw. Some members of this group develop a rattle at the end of the tail.

Vipers are essentially like pit vipers with the exception of the external pit and the hollowed-out maxillary. They are restricted to the Old World, while pit vipers occupy both the New and parts of the Old World. All are extremely poisonous.

Only one genus, *Crotalus*, is found in Utah. The members of this and another genus, *Sistrurus*, are provided with a rattle and are known as rattle snakes. They are found only in the New World from Canada to Brazil. The greatest number of species occur in the southwestern United States.

The rattle is a series of horny shell-like structures loosely fitted together. One appears each time the skin is shed. The rattle is a part of the epidermal covering which periodically loosens but is held to the tail while the rest of the body covering is lost. As the rattlesnake sheds its skin probably three times a year in the temperate regions the fallacy of the common belief of one rattle a year will be seen. If the button, with which the snake is born, does not terminate the series of rattles there is no way of determining the age. If it does, two rings are allowed for the first year and three for each subsequent one. It must be added, however, that this rule is only general in its application. One small specimen in the Station, 15 inches long, and taken at Mantua, Boxelder County, on August 21, 1920, has two rattles and a button. Another individual, 11 $\frac{3}{4}$  inches long, taken in Parowan, Iron County, on June 6, 1920, has only one button. The first specimen is too large to have been born in 1920 as the young do not appear until probably late summer. The second specimen was unquestionably born in 1919. From these data it appears that *C. oreganus* in Utah may go into winter hibernation with only a button, so that specimens having a button and two or three rattles in late summer are really in their second year; by the following June, still with 2 or 3 rattles, they have nearly completed their second year.

The function of the rattle is not known. Surely, it was not developed as a warning signal to man. It has been suggested that it may serve in attracting the sexes.

#### Genus *Crotalus*

Body heavy, tail short, ending with a rattle; head abruptly distinct from neck; conspicuous pit between nostril and eye; large erectile fang fixed in the short maxillary bone at the anterior end of the upper jaw; upper surface of head except snout covered with small scales; anal entire; urotesges entire; scales keeled and in 23 to 31 rows; eye with elliptical pupil.

Only two<sup>4</sup> species are known definitely in the state: The Pacific rattler, *C. confluentus oreganus* is of general distribution, while the horned rattler or "sidewinder," *C. cerastes*, occurs in limited numbers in the Lower Sonoran desert of southwestern Washington County.

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<sup>4</sup>A third species, *Crotalus concolor* Woodbury, has since been described from the Henry Mountains, Utah.

The two species can be distinguished as follows:

A. Supraocular plate flat or rounded, not extended upwards into hornlike process; four small internasals—*Crotalus confluentus oregonus*.

AA. Supraoculars extended upwards into a horn-like process; only two large internasals—*Crotalus cerastes*.

*Crotalus confluentus oregonus* Holbrook  
Great Basin Rattlesnake

Type locality, banks of the Oregon or Columbia River.

Body stout, tail short; head abruptly distinct from neck, broad and flat on top; rostral much higher than broad; two large preoculars; four small internasals; supraoculars large, separated by three to nine rows of small scales across head; supralabials usually 14 to 16; infralabials usually

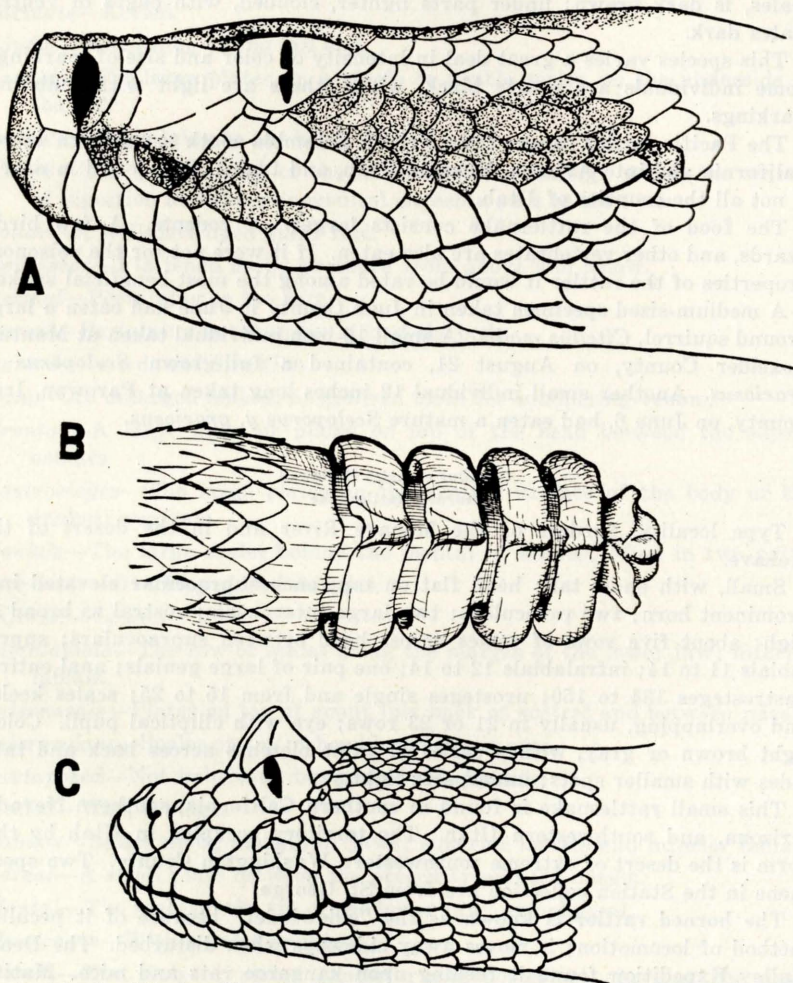


Fig. 10.—The Great Basin rattlesnake, *Crotalus confluentus oregonus*. A, Lateral view of head; B, end of tail, showing rattle; C, horned rattlesnake, *Crotalus cerastes*.



15 to 17; one pair of large genials; two or four rows of scales between eye and upper labials; scales in 25 rows, but may be 23 or 27, dorsal scales keeled; gastrosteges 158 to 189; urosteges single and from 14 to 27; anal entire; eye with elliptical pupil; ground color is brown to grayish; large dark blotches are found along the back which become narrower and extend farther downward over sides towards the posterior end of snake; the blotches are usually narrowly edged with black; and number from 27 to 41 on the body and 3 to 9 on the tail; a series of smaller blotches is found on the sides; supraoculars are crossed by a white line faintly continued across scales between them; a white line begins back of the nostril and extends obliquely backward to the angle of the jaw; a faint light stripe about the width of three scales arises back of the eye and passes obliquely to the back of the head; the stripe between these two light ones, involving two or three scales, is dark brown; under parts lighter, clouded, with edges of ventral plates dark.

This species varies a great deal in intensity of color and size of markings. Some individuals are nearly black, while others are light with indistinct markings.

The Pacific rattler ranges from British Columbia south to northern Lower California and into Arizona, Nevada, Utah, and Idaho. It is found in nearly if not all the counties of Utah.

The food of the rattlesnake consists largely of rodents. A few birds, lizards, and other vertebrates are also eaten. If it were not for the poisonous properties of the rattler it would be rated among the most beneficial snakes.

A medium-sized specimen taken in Juab County in June had eaten a large ground squirrel, *Citellus mollis*. A small 15-inch individual taken at Mantua, Boxelder County, on August 21, contained a full-grown *Sceloporus g. graciosus*. Another small individual 12 inches long taken at Parowan, Iron County, on June 6, had eaten a mature *Sceloporus g. graciosus*.

*Crotalus cerastes* Hallowell  
Horned Rattlesnake

Type locality, borders of the Mohave River and in the desert of the Mohave.

Small, with short tail; head flat on top; each supraocular elevated into prominent horn; two preoculars; two large internasals; rostral as broad as high; about five rows of scales across head between supraoculars; supralabials 11 to 14; infralabials 12 to 14; one pair of large genials; anal entire; gastrosteges 134 to 150; urosteges single and from 15 to 25; scales keeled and overlapping, usually in 21 or 23 rows; eye with elliptical pupil. Color, light brown or gray, with a series of faint blotches across back and tail; sides with smaller spots; underparts lighter.

This small rattlesnake is found in southern California, southern Nevada, Arizona, and southwestern Utah. The territory occupied in Utah by this form is the desert of extreme southwestern Washington County. Two specimens in the Station collection are from St. George.

The horned rattler is known as the "sidewinder" because of its peculiar method of locomotion; it moves away sideways when disturbed. The Death Valley Expedition found it feeding upon kangaroo rats and mice. Mating takes place during the latter part of April and the early part of May.

# GLOSSARY

- Abdominal*—Pertaining to the lower surface of the body.
- Abdominal plates*—The large transverse plates on the lower surface of the snake's body; gastrosteges; ventrals.
- Acuminate*—With a sharp point at the end.
- Anal plate*—The large scale just in front of the anus in snakes and lizards.
- Anterior*—The fore part of the body.
- Anus*—The external opening of the cloaca at the end of the body and the base of the tail.
- Canthus rostralis*—An anterior continuation of the superciliary ridge marking the junction of the top with the side of the head.
- Carinate*—Keeled.
- Caudal*—Pertaining to the tail end.
- Caudals*—The large plates, in a single or double series, on the underside of the tail.
- Cephalic*—Pertaining to the head.
- Cloaca*—The last division of the large intestine through which the wastes of digestion and the urinogenital elements pass to the anus.
- Collar*—A well-developed gular fold.
- Depressed*—Flattened as by pressure from above and below.
- Dermal*—Pertaining to the skin.
- Dorsal*—Pertaining to the upper side of the body.
- Dorsad*—In a dorsal direction.
- Fang*—An enlarged hollow, or grooved tooth for conducting venom.
- Frontal*—A large plate or plates on top of the head between the supraoculars.
- Gastrosteges*—The large plates on the ventral surface of the body of the snakes; ventrals.
- Genials*—The large scales behind the mental in snakes; often in two pairs.
- Imbricate*—Overlapped like shingles.
- Inferior*—Lower.
- Infralabials*—The row of scales along the margin of the lower jaw; inferior labials.
- Internasals*—Plates on top of snout just back of rostral and between nasals.
- Interoculars*—Scales on top of head between the eyes.
- Juxtaposed*—Not imbricate, but placed side by side.
- Keeled*—With a ridge.
- Labials*—Scales along margin of jaws; superior labials and inferior labials.
- Loreal*—A small plate between the preocular and the nasals.
- Mental*—The scale on the tip of the lower jaw; symphyseal.
- Mucronate*—With a point or spine.
- Nasals*—The plate or plates (anterior and posterior) carrying the nasal opening.



*Occipital*—Pertaining to the back of the head above.

*Occipitals*—Plates behind the parietals; sometimes applied to the parietals.

*Ocular*—Pertaining to the eye.

*Orbit*—The eye socket.

*Oviparous*—Egg-laying.

*Ovoviviparous*—Retaining the eggs until hatched so that living young issue from the parent.

*Parietals*—In most snakes they are the largest and last plates on the top of the head; in lizards they are the plates at the side of the interparietals and behind the frontoparietals.

*Postanal*—Behind the anus.

*Posterior*—Pertaining to the hind part of the body.

*Postgenials*—The second or posterior pair of genials.

*Postnasal*—The posterior nasal.

*Postocular*—Scales bounding the eye behind.

*Preanal*—The front of the anus.

*Prefrontal*—Scales between the internasals and frontal; sometimes applied to internasals.

*Pregenials*—The first or anterior pair of genials.

*Prenasal*—The anterior nasal.

*Preocular*—The scale or scales bounding the eye in front.

*Rostral*—The plate forming the tip of the snout.

*Scute*—A large ventral plate; ventral; gastrostegae; a large flat scale.

*Subcaudals*—Urosteges; caudals.

*Sublabials*—Scales below the infralabials.

*Suboculars*—Scales between the eye and the supralabials.

*Superciliary*—The upper, outer edge of the orbit.

*Superior*—Upper.

*Supracaudal*—Over the tail.

*Supralabials*—The scales along the margin of the upper jaw.

*Supraocular*—The large plate above the eye in snakes. The scales above the eye excepting the superciliaries in lizards.

*Temporal*—The posterior part of the side of the head.

*Temporals*—The large scales back of the postoculars and between the supralabials and the parietal in snakes.

*Urosteges*—The large scales in one or two series on the ventral side of the tail of snakes; caudals.

*Vent*—Anus.

*Ventrals*—The large scales on the ventral side of the body of snakes; gastrosteges.

*Viviparous*—Producing living young which during embryonic development have depended largely or entirely upon the mother for food.

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